State Smart Transportation Initiative

Smart Growth America
Improving lives by improving communities

Drivers of VMT and priority reduction strategies

Hawaii

Prepared by Smart Growth America and the State Smart Transportation Initiative
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The State Smart Transportation Initiative works with governors, state DOTs, and other transportation stakeholders to promote transportation practices that advance environmental sustainability and equitable economic development, while maintaining high standards of governmental efficiency and transparency.

Smart Growth America is a national organization dedicated to researching, advocating for, and leading coalitions to bring better development to more communities nationwide. From providing more sidewalks to ensuring that more homes are built near public transportation or that productive farms remain a part of our communities, smart growth helps make sure people across the nation can live in great neighborhoods.

Between 2009-2017, total vehicle miles traveled (VMT) in Hawaii increased by 7.8%. Our analysis indicates that rural and exurban households account for around half of personal travel and VMT among rural households is growing the fastest. We also estimate that around 15% of total VMT is attributable to commercial activities like tourism, freight movement, and deliveries, and that share is growing.

We found that more than 60% of personal trips are under five miles and account for close to 15% of VMT. Around 30% of personal VMT is for trips under 10 miles. This presents important opportunities for more trips to be made by walking, biking, and transit, under the right policies and investments.

Improving multimodal travel options in urban centers and surrounding suburban areas will be critical for managing VMT growth in the state. However, given the significant role the exurban, rural, and commercial VMT play, it will also be important to focus on supportive land use policies, transportation demand management programs, modern road pricing strategies, and logistical improvements in the commercial sector.

I. Introduction

Through support from the US Climate Alliance, the State Smart Transportation Initiative (SSTI) and Smart Growth America (SGA) are providing short-term direct technical assistance to nine states advancing efforts to reduce VMT. These state efforts will support climate goals by curbing emissions from transportation, while also improving convenient affordable transportation options for people who are unable to drive, cannot afford to own a vehicle, or would simply prefer to drive less in their daily trips.

Most states lack information about what factors are driving VMT growth, making it difficult to determine what level of VMT reduction is needed, what is achievable, and what strategies should be prioritized for the greatest impact. To help address this gap, SSTI and SGA conducted an analysis to identify factors that have contributed to statewide VMT growth over the past decade in order to understand the role that VMT could play in achieving future clean energy goals.

This report provides an analysis of recent trends in VMT by road type, place type, and trip length to identify the key drivers of those trends. Based on these findings, the report also outlines key strategies that can be implemented at the state and local level to manage future VMT growth or lower VMT.

II. VMT trends in Hawaii

Analysis approach

This report relies on two key data sources to understand VMT trends and patterns:

1. Total annual VMT by road type (functional classification), as reported by FHWA in Highway Statistics, Table VM-2, from 1994 to 2019.[1] These data reflect conventional thinking about VMT as the total amount of vehicle travel occurring on roads within each state, regardless of trip type, vehicle type, origin or destination.
2. Average annual household VMT at the Census tract level, as reported in the Local Area Transportation Characteristics for Households (LATCH) dataset for 2009 and 2017.[2] These data represent all personal travel by residents within the state, regardless of where the trip occurs. That includes commuting for work and travel for errands, social activities, vacation, and other non-commercial purposes. Estimates of average household VMT are based on regression models, calibrated using data from 2009 and 2017 National Households Travel Surveys (NHTS). These average estimates are multiplied by the number of households reported in the 2011 and 2019 5-year American Community Survey[3] and then multiplied by a factor of 1.2 to match national totals reported in the NHTS Summary of Travel Trends report.

By combining these two data sources, we gain a clearer general understanding of the share of statewide VMT attributable to personal travel, where those VMT originate, and the share of VMT not explained by personal travel—i.e., commercial travel such as goods movement and work-related trips.

A third key data source is the Trips by Distance dataset, compiled for the Bureau of Transportation Statistics during the COVID-19 public health emergency.[4] These data are based on a weighted sample of mobile devices and describe the number of daily trips by trip length since 2019.

Summary of VMT trends and drivers

Since 1994, total VMT in Hawaii has increased by 39%, which includes an increase of 56% on urban roadways, and a 9% decrease on rural roadways. Urban arterials and local roads account for the largest share of VMT growth (Figure 1). The decrease in VMT on rural roadways is partly explained by the reclassification of rural roadways to urban as a consequence of peripheral growth.

[1] https://www.fhwa.dot.gov/policyinformation/statistics.cfm

[2] https://www.bts.gov/latch

[3] IPUMS NHGIS, University of Minnesota, www.nhgis.org

[4] https://www.bts.gov/daily-travel

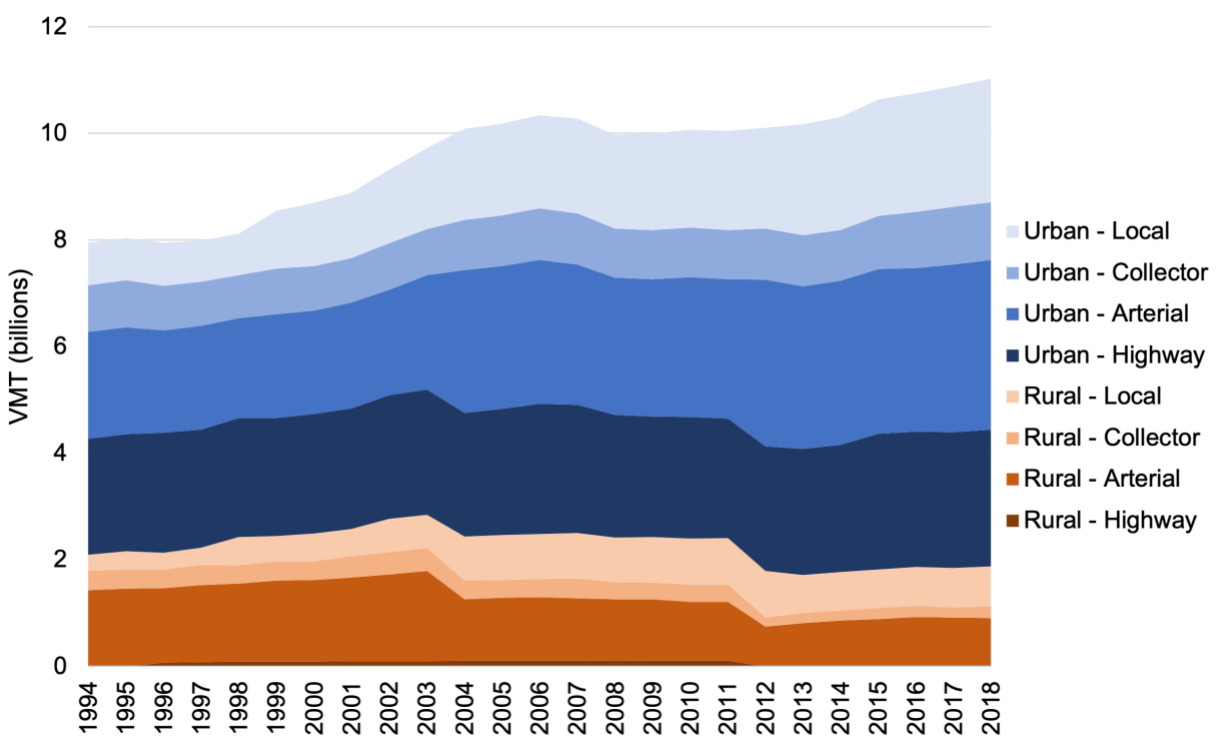

Figure 1. Trends in VMT by roadway type, 1994 to 2018

While our analysis of total VMT by roadway type included years 1994-2018, our analysis of household VMT by home location was limited to 2009 and 2017. We found that household VMT increased by only 1.5%, compared to a 7.8% increase in total VMT during the same eight-year period. That means the share of VMT explained by personal travel dropped from around 87% to 82%. For comparison, about 73% of total VMT is attributable to personal travel nationwide. As noted above, the remaining share of VMT can be explained by commercial travel such as tourism, freight movement and deliveries.

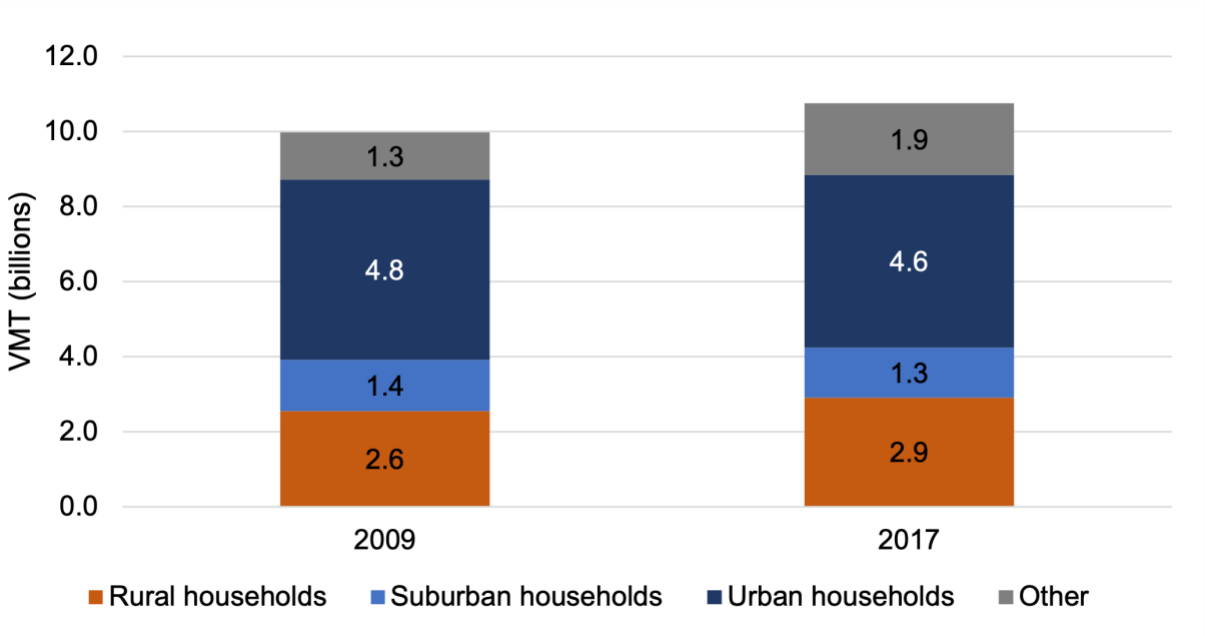

Figure 2. Trends in VMT by household type, 2009 and 2017

Figure 2 and Table 1 both provide a summary of VMT trends between 2009 and 2017, including the estimated distribution of household VMT by residential place type (urban, suburban, or rural, as defined in the LATCH data) compared to total VMT. "Urban" areas include high density census tracts in census designated urban areas or urban clusters. "Suburban" areas include low density census tracts in urban areas or urban clusters. "Rural" areas include census tracts that are not in urban areas or urban clusters, but many of these are high-growth areas on the urban fringe where undeveloped land is being converted into suburban development patterns (as opposed to what we often think of as rural places). Figure 3 depicts these place types for the island of Oahu, and Figure 4 shows areas of considerable VMT growth. Area type definitions and statewide maps are included in Appendix A.

It is important to note in Table 1 that some changes in the distribution of households and VMT among different place types is due to the reclassification of individual census tracts. For instance, the number of households in "suburban" areas—based on 2009 classifications—grew by 7%. However, many of those tracts were then reclassified as urban or rural, leading to a net decrease among suburban households, overall. These changes can be due to increasing or decreasing population density and reclassification of urbanized areas by the U.S. Census, often because of outward urban growth.

Table 1. Summary of VMT attributes and changes, 2009 to 2017 (using urban classification definitions from both years in 2017; changes relative to 2009)

	2009	2017 (2009 class.)	2017 (2017 class.)
Total population (thousands)	1,346.6	1,422.1 (+5.6%)	1,422.1 (+5.6%)
Total households (thousands)	445.5	459.4 (+3.1%)	459.4 (+3.1%)
Households: Urban (thousands)	266.5	270.4 (+1.5%)	273.3 (+2.6%)
Households: Suburban (thousands)	58.9	63.0 (+7.1%)	58.1 (-1.2%)
Household: Rural (thousands)	120.1	126.0 (+4.9%)	128.0 (+6.5%)
Average HH VMT: Urban	18,029	16,987 (-5.8%)	16,865 (-6.5%)
Average HH VMT: Suburban	23,192	22,230 (-4.1%)	22,807 (-1.7%)
Average HH VMT: Rural	21,237	22,664 (+6.7%)	22,774 (+7.2%)
Total HH VMT: Urban (billions)	4.805	4.593 (-4.4%)	4.609 (-4.1%)
Total HH VMT: Suburban (billions)	1.365	1.401 (+2.6%)	1.326 (-2.9%)
Total HH VMT: Rural (billions)	2.552	2.855 (+11.9%)	2.915 (+14.2%)
Total HH VMT (billions)	8.722	8.850 (+1.5%)	8.850 (+1.5%)
Other VMT (billions)	1.251	1.899 (+51.7%)	1.899 (+51.7%)
Total VMT (billions)	9.973	10.749 (+7.8%)	10.749 (+7.8%)
VMT per capita	7,406	7,558 (+2.1%)	7,558 (+2.1%)
Average HH VMT	19,576	19,263 (-1.6%)	19,263 (-1.6%)

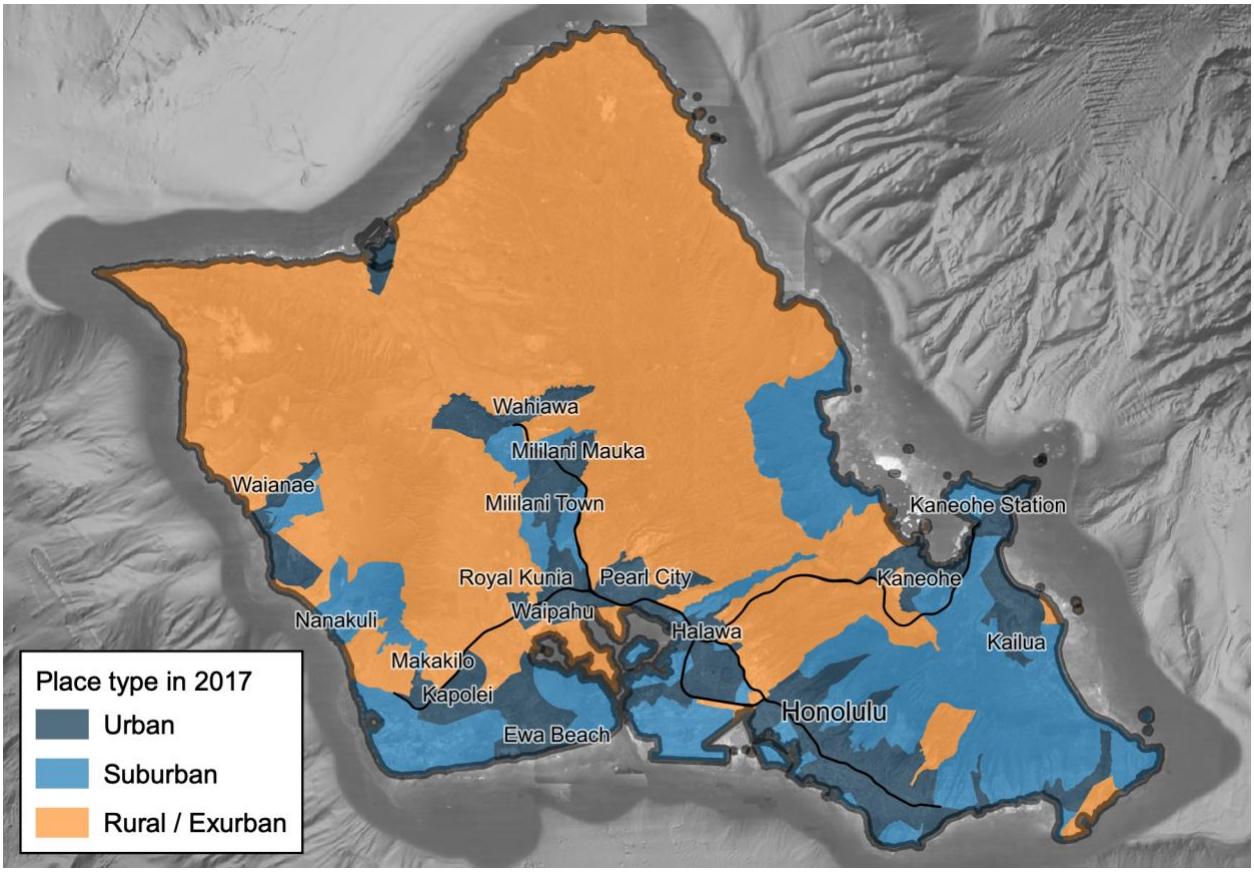

Figure 3. Place type definitions, 2017

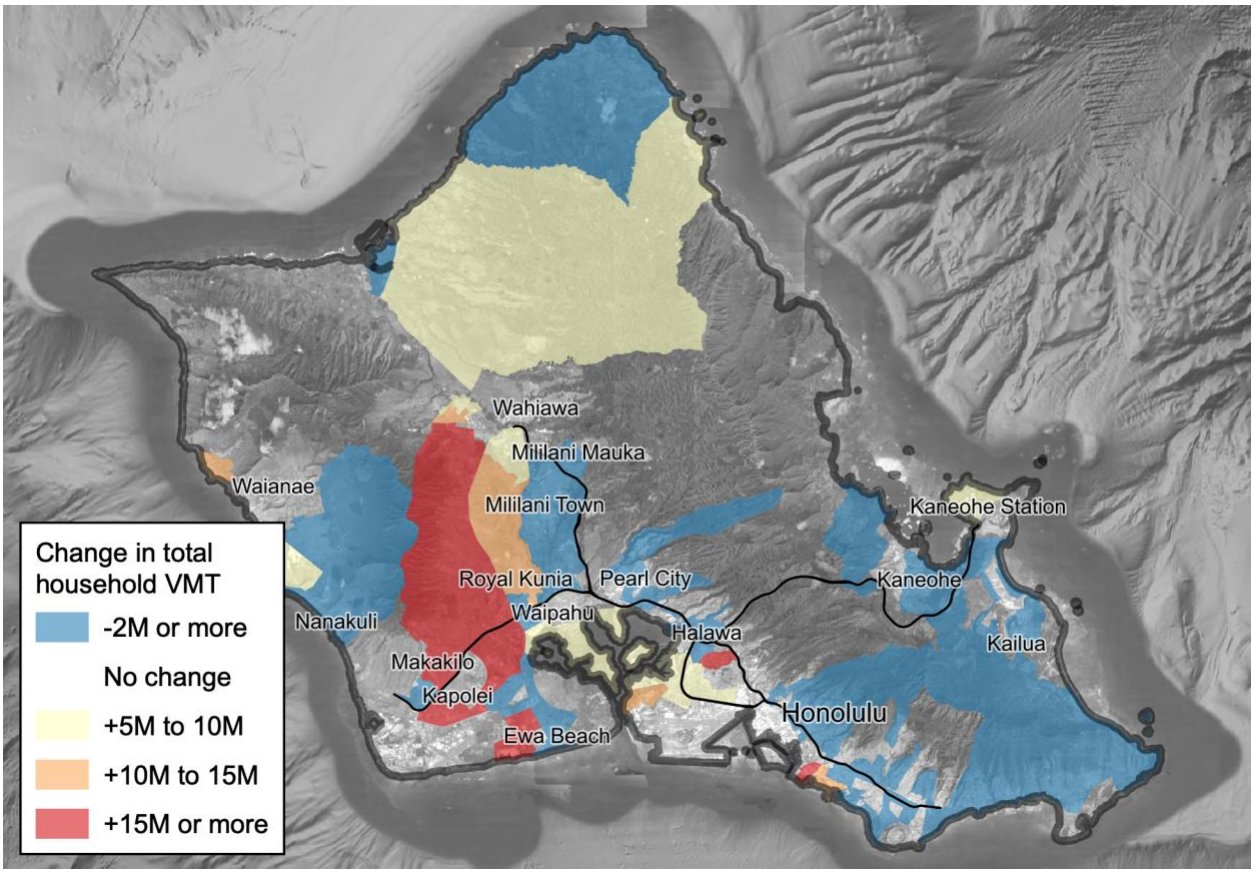

Figure 4. Change in total household VMT, 2009 to 2017

Trip length data reveals that the distribution of trip lengths in Hawaii is relatively consistent over time, even while travel dropped considerably early in the pandemic. About 30% of trips are under one mile, about 60% are under three miles, and few trips are greater than 25 miles. This means that 15% to 20% of total VMT is for trips under five miles and about 30% is for trips under 10 miles. This presents an opportunity to shift many trips to walking, biking or transit in many locations.

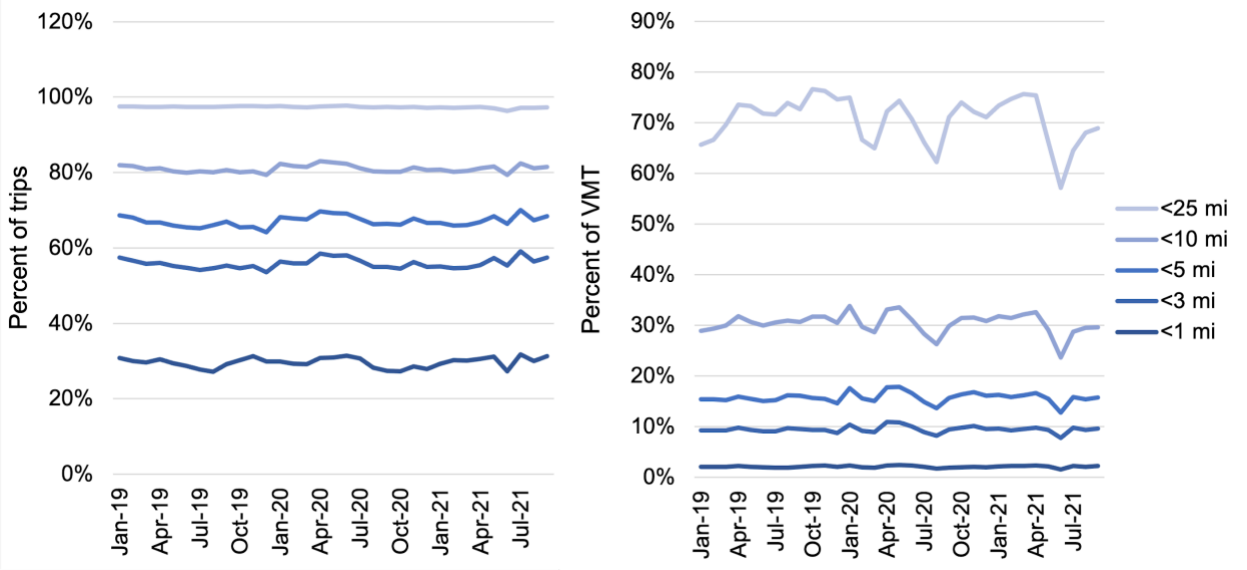

Figure 4. Trends in VMT by trip length, 2019 to mid-2021[5]

Priority strategies based on VMT trends

From the above analysis, we can identify key strategies for mitigating and reducing VMT in Hawaii and gauge the potential impact of each strategy based on knowledge from existing research and literature (Table 2). This includes guidance from the California Air Pollution Control Officers Association (CAPCOA) describing the potential impact of various strategies (and combinations of strategies) on project-level VMT.[6] For example, transit enhancements may reduce an individual's VMT by up to 10%, bike and pedestrian enhancements may reduce an individual's VMT by up to 5%, and the combined effect is slightly less than 15%.

These project-level impacts do not tell the full story regarding the potential impact of each policy across the state. For that, agencies should decide where in the state each policy is applicable and to what extent, then apply the factors below across future and existing households, as described in "VMT scenarios and target-setting," below. This is similar to the approach used in Transcending Oil.[7]

[5] https://www.bts.gov/daily-travel

[6] http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

[7] https://www.transcendingoil.com/

Table 2. VMT management strategies and potential average impact (● = 5%)

Strategy	Potential VMT impact
Land use	●●●●●●●●●●●●○○○○○○○○
Constrained highway spending	●●●○○○○○○○○○○○○○○○○○
Travel options: Transit enhancements	●●○○○○○○○○○○○○○○○○○○
Travel options: Bike and pedestrian enhancements	●○○○○○○○○○○○○○○○○○○○
TDM: Commuter benefits	●●○○○○○○○○○○○○○○○○○○
TDM: Parking policy	●●●●○○○○○○○○○○○○○○○○
TDM: Road pricing	●●●●●○○○○○○○○○○○○○○○
TDM: Broadband and remote access	●○○○○○○○○○○○○○○○○○○○

Based on the analysis above, there is great potential in Hawaii to focus on VMT reduction efforts in urban and suburban areas, but rural and commercial VMT are also on the rise and make up a considerable share of overall VMT. Land use strategies that encourage infill development and limit rural growth into outlying areas, particularly around developed cities, will play an important role. In rural and exurban areas, lowering average household VMT will likely involve more concentrated development around central towns and activity centers, rural or on-demand transit services, and investments in broadband infrastructure to improve remote access.

Land use

Location and land use patterns are some of the most influential factors affecting VMT. According to data from the National Household Travel Survey, households in suburban areas drive around 37 percent more than those in urban centers and households on the suburban fringe drive 68 percent more. Limiting outward growth and concentrating more growth in urban infill areas will be critical for Hawaii.

1) Zoning changes and infill incentives (local/regional)

Most land use and development decisions fall under the jurisdiction of local municipalities, meaning that achieving compact mixed-use development patterns that reduce travel demand may require widespread changes in zoning codes and minimum parking requirements. Cities like Buffalo, New York; Hartford, Connecticut; and Nashville, Tennessee, for instance, have implemented form-based

zoning codes that encourage this development style and eliminate private parking requirements for all or part of the city.[8]

States and regional agencies can provide model land use regulations for local municipalities or even mandate local land use regulations that encourage more compact development, such as in California and Connecticut, where there are now restrictions on the use of single-family zoning.

2) Reforming traffic impact assessments (local)

Traffic impact assessments, which are often aimed at meeting the travel demands of new developments through road capacity investments, often present a barrier for urban infill in high-traffic areas. However, some cities like Arlington, Virginia; Cambridge, Massachusetts; and many across California require developers to limit the amount of new car travel they produce through a range of transportation demand management (TDM) measures. Instead of planning for increased traffic and VMT, this approach ensures steps are taken to limit new driving as a result of development, incentivizing and lowering barriers to central, infill development in the process.

For example, in San Francisco, nearly all development projects must meet a TDM requirement to receive approval. The city provides a menu of TDM strategies such as improving walking conditions, providing bicycle parking, providing car-sharing parking, and on-site childcare with points associated with each strategy based on potential impact. Projects receive a points target based on the type of project and must develop a plan for meeting that target using a mix of the TDM strategies provided.[9] San Jose uses a spreadsheet-based tool to estimate the VMT impacts of proposed development projects. Other cities like Madison, Wisconsin, and Saint Paul, Minnesota, are implementing similar programs.

3) Growth management programs (state)

While land use and development are often controlled at the local level, there are steps that state and county governments can take to curb the outward, low-density growth that contributes most to rising VMT. This includes establishing urban growth boundaries, land conservation programs, and banks for transferring development rights—all of which help preserve open space and encourage more compact growth patterns, concentrated in central locations.

These programs all work in conjunction with local land use regulations, it is important that the State works with local governments by providing model land use policies, or even mandating certain local provisions, as described above.

4) Land use considerations in transportation investments (state DOT)

While not in the state's direct control, the Hawaii DOT can encourage land use patterns that lower VMT by accounting for local development patterns and land use policies in project prioritization and

[8] https://formbasedcodes.org/

[9] https://sfplanning.org/transportation-demand-management-program#about

programming. For instance, the Virginia DOT prioritizes projects that enhance walkable land uses.[10] This can help set a precedent that the state will support good local land use planning and not automatically facilitate increased travel demand driven by low density, outward growth. The Florida DOT has taken other steps to encourage localities to be partners with their land use decisions, including calling for supportive land uses in its Complete Streets guidelines.[11]

Constrained highway spending

Investing in road capacity to alleviate congestion is one of the principal charges among most state DOTs and many local transportation agencies. While there are some important projects to relieve bottlenecks and improve highway operations, most capacity investments play a key role in facilitating VMT growth. A growing body of research indicates that new traffic often appears within 5 to 10 years after a road project, filling up any additional road capacity and increasing driving among nearby populations (including those in new developments spurred by infrastructure investments). This is typically called "induced demand." Highway projects intended to spur local economic growth also tend to just shift growth from one part of a region to another, resulting in relatively small net benefits, while potentially spreading activities farther apart.

5) Planning and modeling for VMT impacts (state/regional/local)

Long-range plans are important documents for establishing goals or intended outcomes related to travel options and VMT, but the tools and metrics used to implement those plans still tend to be oriented toward vehicle capacity and throughput. Agencies responsible for planning can evaluate the impacts of their plans on VMT and other related outcomes using sketch-planning tools like VisionEval[12] and UrbanFootprint[13] or, in some cases, existing travel demand models. It is important to note, however, that most travel demand models cannot capture the impacts of induced demand, especially when they do not account for variations in land use or development patterns. An important step in evaluating any plan, regardless of the tools being used, is to consider total VMT and average household VMT as an evaluation criterion (or even proxy measures like access to jobs and services), and move away from simpler measures of vehicle delay or level of service (LOS), which tend to favor capacity expansions.

6) Transportation project prioritization (state/regional/local)

Some transportation funding, both federal and state, comes with strings attached. But most road funding is flexible enough to be used for projects other than physical capacity expansions, or could be with appropriate state-level policies in place. These projects include simple operational improvements like managed lanes and intelligent transportation systems (ITS); safety improvements including traffic calming, speed management, and safer bicycle and pedestrian accommodations; and spending on state of good repair (i.e., "fix it first".) State and local governments responsible for allocating funds can prioritize the kinds of investments that are least likely to increase VMT. State and local transportation agencies can also establish project prioritization criteria to formally evaluate the potential impact of

[10] https://www.smartscale.org/about/default.asp

[11] http://www.flcompletestreets.com/

[12] https://visioneval.org/

[13] https://urbanfootprint.com/

transportation investments on VMT and prioritize those with the lowest VMT impacts in their transportation improvement programs (TIPs).

The state of Virginia, for example, prioritizes all of its major transportation investments using evaluation criteria that: a) consider person throughput over vehicle throughput, b) consider multimodal access to jobs and services by all travel modes, and c) favor places with "transportation-efficient" land uses.[14] Examples of other project prioritization programs and best practices are outlined in a report by SSTI called, Modern Project Prioritization for Transportation Investments.[15] The state of California formally evaluates the VMT impacts of its projects, and will be required to mitigate those impacts, in accordance with environmental law S.B. 743.[16] Caltrans currently relies on an induced demand calculator that was developed by UC Davis for major highway capacity projects[17] and recently expanded for use in any state by the Rocky Mountain Institute and other national advocacy groups.[18] More details on the programs in California and Virginia are included in Appendix B.

Investing in travel options

While reining in road expansion and promoting good land use can reduce VMT, residents also need safe and convenient options for getting around without a car. Given that 15% of VMT in Hawaii comes from trips that are five miles or less, and 30% comes from trips that are ten miles or less, the state has a real opportunity to shift some of those trips to other modes, particularly in urban and suburban areas.

7) Transit enhancements, including in exurban areas (state/regional/local)

Investing in frequent and reliable transit service that connects people to jobs and major activity centers is important for shifting many of the longest everyday trips (commuting) to modes other than driving. Transit can also serve many more travel needs in compact urban areas. States can allocate more funding for transit—including capital investments to expand or improve service and operating funds to run transit services—while DOTs can often use existing road funds to improve or enhance transit service. This includes operational improvements like dedicated facilities and bus priority signals (especially to support bus rapid transit), bus platforms or shelters, and bicycle or pedestrian improvements that provide connections to transit stops.

In addition to funding transit directly, the state can also offer support to smaller transit providers by offering tools, technical assistance, and grants to design their transit systems to meet residents' needs as efficiently and cost-effectively as possible—needs which can vary significantly across communities. That could mean offering assistance for agencies to conduct transit market studies and transit network redesign studies. Transit agencies in places like Columbus, Ohio, and Houston, Texas, saw ridership increases following network redesign efforts, while a number of rural communities around

[14] https://www.smartscale.org/

[15] https://ssti.us/2021/05/18/three-steps-toward-smarter-transportation-investments/

[16] https://opr.ca.gov/ceqa/sb-743/

[17] https://travelcalculator.ncst.ucdavis.edu/

[18] https://shift.rmi.org/

the country, such as Paris, Texas, and Burlington, North Carolina, have successfully improved transit service to meet user needs.[19]

According to CAPCOA, transit investments can lower average VMT by around 10%, with the largest impacts coming from network expansions and smaller impacts from service enhancements and accessibility improvements. In rural areas, the impacts will depend largely on local land use patterns and the ability of rural communities to cluster residents and activity centers around central nodes or villages.

8) Walking and biking improvements (state DOT/regional/local)

Investing in safer and more convenient infrastructure for walking and biking in areas with supportive land uses (compact and mixed use) can help shift many short trips from driving. And perhaps more importantly, making similar first- and last-mile improvements near transit can significantly increase people's access to jobs and services without driving. The opportunities in urban and suburban areas are often more apparent, but many areas considered rural or exurban also have compact nodes of development where many people live a short distance from jobs, services, and recreation. Local land use policies can support more node-like development, while road designers can provide safe infrastructure connecting those places.

In practice, this involves robust Complete Streets policies and projects focused on creating connected walking and biking networks. Complete Streets programs are a great start, but projects that align with transit connectivity and connect residential zones with amenities will need to be prioritized, especially in exurban areas. It will also involve more robust traffic calming and bike- and pedestrian-friendly road design. All roads, even those without dedicated bicycle and pedestrian facilities, especially in exurban areas, need to be friendly to pedestrians and bicycles. Streets that feel dangerous act as barriers and encourage more trips by car.

According to CAPCOA, bicycle and pedestrian improvements, paired with other neighborhood design components like traffic calming, can reduce average VMT by up to 5% in urban areas. Again, their efficacy in more rural and exurban areas will depend on local land use patterns.

Transportation demand management

In addition to supportive land uses and transportation options, lowering VMT ultimately requires incentives or "nudges" that encourage individuals to think differently about their travel choices and make it easier for them to change travel habits. These policies and programs fall under the broad category of transportation demand management (TDM)—a term that arguably pertains to everything in this report. Several key TDM categories are outlined below.

9) Commuter benefits (state/local)

Nationally, about 25% of household VMT is for commuting to and from work, so commuter incentives can have a large overall impact. Many employers already cover various commuter costs (like parking or transit costs) as benefits to their employees, and federal tax policy includes an

[19] https://t4america.org/wp-content/uploads/2021/09/ThirdWay_Layout_090921-3.pdf

exclusion of up to $270 per month for those costs.[20] Whereas free or discounted parking is one of the most compelling incentives for employees to drive to work, incentives for transit, ridesharing, and other alternatives to driving can have the opposite effect.

These incentives include transit subsidies, shuttles, ride sharing programs, bicycle amenities like showers and lockers, on-site services like daycare and dining, and policies that pass along parking costs directly to employees, such as parking fees or cashout programs. Research even suggests that these incentives can have a spillover effect and influence people's travel choices when they are not working or commuting.[21]

According to CAPCOA, comprehensive commuter benefit programs can reduce commute VMT by 25%, school VMT by 65%, and overall VMT by 15% in urban areas and areas with good travel options.

10) Parking reform and pricing (local)

Excessive and underpriced parking is one of the key factors influencing people's decision to drive when other options are available, and it inadvertently makes walking and biking harder by creating longer distances between destinations. Limiting excessive parking and making parking costs more transparent to users can have the opposite effect, by encouraging travelers to consider their options and make more informed decisions about the relative costs and benefits of travel decisions. Moreover, "free" parking treats parking as a sunk cost, thereby requiring everyone to pay for it through taxes, increased prices for goods and services, and higher housing costs, regardless of whether they choose to drive or travel by other means.

Charging users directly for parking (even by modest amounts) can be one of the most effective TDM strategies. Local governments have some limited opportunities to encourage pricing, including charging for municipal or on-street parking and requiring developers or building owners to unbundle the costs of parking from apartment and building leases, such as in Seattle, Washington. However, pricing can be difficult when there is excessive supply, so an important first step for local governments is to loosen or eliminate minimum parking requirements from their zoning codes (starting with central business districts and transit priority areas) and even move toward maximum parking allowances. States can also support these efforts, if not through mandates on local parking requirements, then through local planning grants and model policies.

According to CAPCOA, parking policies that limit the available supply, unbundle the costs of parking from apartment or building leases, and price on-street parking can reduce average VMT by around 20% in urban areas.

11) Road pricing (state)

Unlike other transportation options like transit or ride hailing services, drivers typically do not pay the costs of each trip upfront. Some costs are paid on a regular basis via fuel purchases, but most

[20] https://www.irs.gov/pub/irs-pdf/p15b.pdf

[21] https://www.sciencedirect.com/science/article/abs/pii/S0967070X1930469X

system costs are covered indirectly by public agencies. Moreover, transportation revenues from fuel taxes have been declining and will continue to drop as more vehicles become electrified.

Nationally, there is growing interest in moving toward alternative road pricing mechanisms such as mileage-based user fees, tolls, and fees for entering heavily congested areas (i.e., "congestion pricing" or "cordon pricing"). These pricing schemes may increase the overall cost of driving on a per-mile basis, but they can also make drivers more aware and conscious of driving costs they already pay indirectly. It often takes a small pricing cue for individuals to reconsider their travel habits and behaviors. These fees can be doubly impactful if they are directed toward transit improvements in the affected area, thereby improving travel options for travelers who cannot drive or do not wish to pay higher fees.

California, Oregon, and Utah are exploring mileage-based pricing through pilot programs. Other examples include Virginia's dynamic tolling program along I-66 outside of Washington, DC, priced dynamic shoulder lanes like those on I-35 in Minnesota's Twin Cities, and the congestion pricing program planned for New York City.

According to CAPCOA, pricing strategies like tolling, cordon and congestion pricing, and mileage-based user fees can reduce VMT by as much as 25%.

12) Broadband and remote work (state/local)

Broadband internet access can make it easier for people to work, attend school, and access other services without needing to drive or without driving as often. However, there is also evidence that remote work is linked to higher VMT. Some research suggests teleworking may reduce commute-related VMT by as much as 20% (best estimate around 8%),[22] but studies that also look at non-work travel suggest telework could have no net impact or even increase total VMT by around 4%. There seem to be two main reasons: 1) teleworkers are more likely to live farther from work, so the days they commute require longer trips; and 2) teleworkers travel more for non-work travel, partly because they have fewer opportunities to combine trips (aka "trip chaining").[23] Offering remote work as an option and improving broadband can still be valuable strategies, particularly in the exurban areas where VMT has increased considerably, but they will need to be paired with land use strategies to cluster non-work destinations like shopping, healthcare, and schools near housing.

Commercial VMT

The policies described above mainly target personal travel, but decreases in household VMT can also translate into higher commercial VMT, such as when shifting from brick and mortar shopping to at-home delivery services. Medium- and heavy-duty vehicles account for approximately 22% of energy use in the U.S. transportation sector.[24] The following strategies are aimed at managing future growth in commercial VMT, which includes freight movement and delivery services. In Hawaii, this also includes travel related to tourism.

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[22] https://iopscience.iop.org/article/10.1088/1748-9326/ab8a84

[23] https://www.sciencedirect.com/science/article/abs/pii/S1361920919314026

[24] https://www.chargingusforward.com/recommendations

Given the unique challenges of managing commercial VMT, compared to personal travel, freight movement and delivery services might be a crucial area on which the state may wish to focus technological investments that help lower energy use. In the near-term, this includes investments in truck charging stations and connected vehicle technologies. In the longer term, this means helping bring alternative fuel freight vehicles to market through research support, public subsidies, and infrastructure investments like managed lanes for freight and large vehicles.

13) Commercial efficiency

Lowering commercial VMT depends in large part on improving the efficiency of freight distribution and movement. That includes making fewer overall trips, carrying more goods per trip, and shortening the distances that goods need to travel. Nationally, around 15 to 20 percent of trucking miles are driven with an empty vehicle.[25] Specific strategies to curb the growth in commercial VMT include: 1) improved logistics models aimed at limiting excess or empty trips, 2) programs to bundle deliveries and carry more goods per vehicle, and 3) concentrating deliveries at centralized hubs or lockers.

States and local governments can support commercial efficiencies through public subsidies, cooperative investment in infrastructure, and data sharing. Additional policy levers include fees on heavy vehicles and delivery services (including mileage-based road pricing, discussed above), which can help manage traffic congestion in addition to lowering VMT. The potential impact of policies for managing commercial VMT is less understood than policies aimed at personal VMT.

VMT scenarios and target-setting

While each of the strategies described above has a different potential impact on individual travel behaviors, their total impact ultimately depends on how extensively they can be applied across different populations and place types. DOTs and other state agencies interested in understanding those potential impacts or setting long-term VMT targets may benefit from analyses that demonstrate the magnitude of those impacts under different land use and policy scenarios. Based on the analysis of VMT trends and knowledge of the potential policy impacts outlined above, this kind of analysis can be conducted in several steps:

1. Estimate the average VMT for households in different area types (e.g., urban, rural, and suburban). This can be done using the Local Area Transportation Characteristics for Households (LATCH)[26] survey or available local data.
2. Estimate the share of households in each area type in the forecast year. This can be based on current trends or a future policy scenario.
3. Apply policy assumptions to each area type—e.g., transit investments will lower average VMT in urban areas by 5%—and estimate the total impact of different policy combinations.

This exercise will give agencies a better understanding of: 1) which policies are the most impactful and which are "low hanging fruit," 2) which agencies and partners should be engaged, and 3) what are realistics VMT benchmarks, targets, or ranges of targets for evaluating progress. Several of these

[25] https://truckingresearch.org/2021/11/23/an-analysis-of-the-operational-costs-of-trucking-2021-update/

[26] https://www.bts.gov/latch

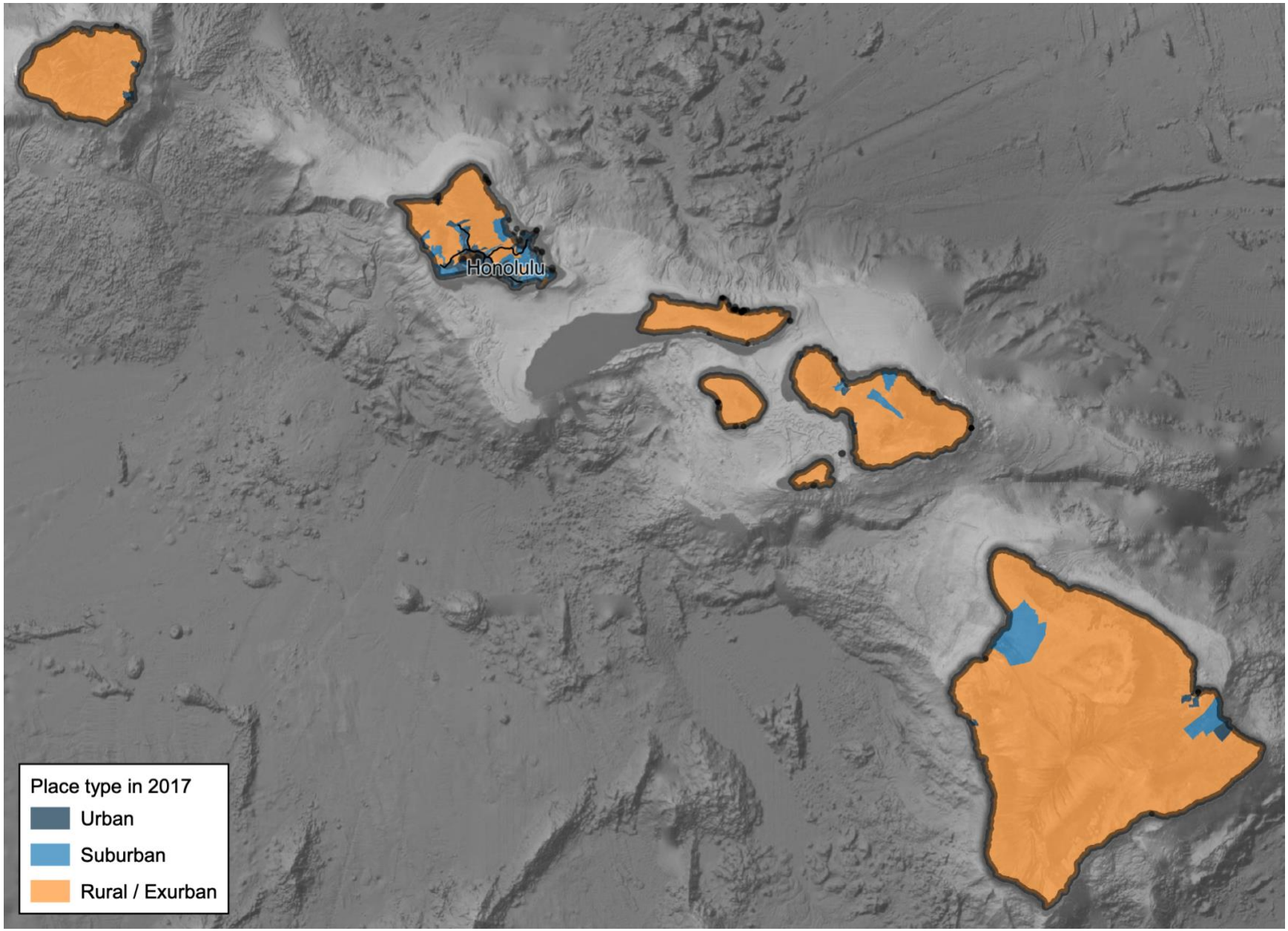
scenarios were analyzed for a few other states also participating in the U.S. Climate Alliance technical assistance.

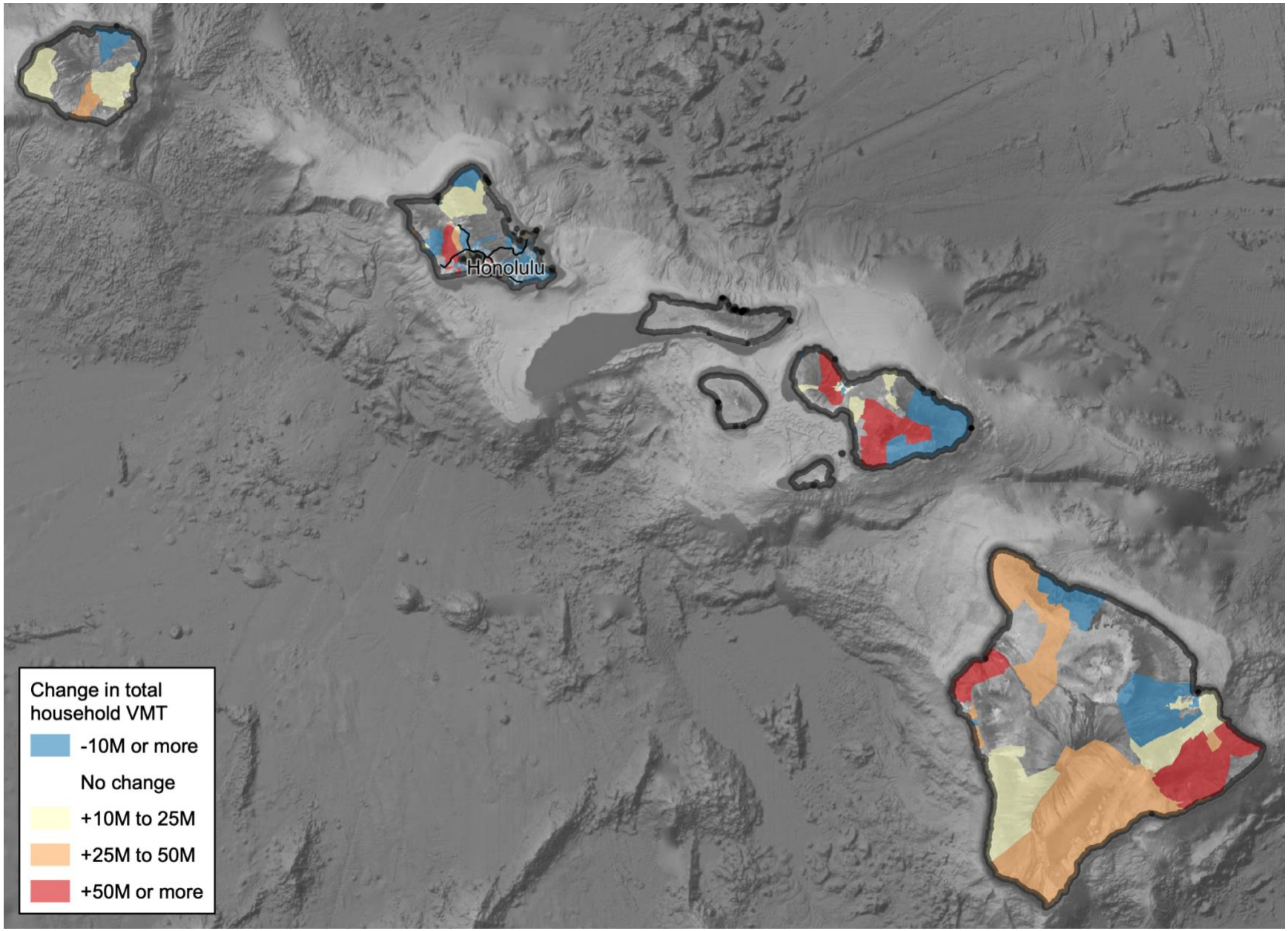
Appendix A. Area type definitions and statewide maps

Table A1. Area type definitions[27]

Category	Census tracts	Population density centile
Urban	In Urbanized Areas (UAs): >50,000 people	60 to 100
	In Urban Clusters (UCs): 2,500 to 50,000 people	30 to 100
Suburban	In Urbanized Areas (UAs): >50,000 people	Up to 60
	In Urban Clusters (UCs): 2,500 to 50,000 people	Up to 30
Rural	Not in UA or UC	N/A

[27] https://www.bts.gov/latch/latch-methodology


Honolulu
Place type in 2017
Urban
Suburban
Rural / Exurban


Honolulu
Change in total household VMT
-10M or more
No change
+10M to 25M
+25M to 50M
+50M or more

Appendix B. Recommendations for implementing VMT reduction strategies in Hawaii

This document provides an overview of best practices and other considerations to guide VMT reduction efforts in Hawaii.

Adopting a statewide VMT reduction goal

Several states or state agencies have explored or established VMT reduction targets or similar goals aimed at reducing transportation emissions:

1. **Maine**: The Maine Climate Council released a climate action plan in 2020, which called for a 10% reduction in light-duty VMT by 2025 and a 20% reduction by 2030.[28]
2. **Washington**: The State of Washington established legislation in 2011 that required an 18% reduction in VMT per capita by 2020.[29] Those targets were not met, so WSDOT and other state agencies are reevaluating the effort and developing a new action plan.
3. **Minnesota**: The Minnesota DOT is currently working on setting internal VMT reduction targets based on recommendations from its Sustainable Transportation Advisory Committee (STAC).[30] The STAC recommended a 20% VMT reduction by 2050. Agency leaders are working with staff and stakeholders to determine reasonable targets and develop an action plan for meeting those targets.
4. **Colorado**: The Colorado Transportation Commission approved a rule late in 2021 that requires the Colorado DOT and MPOs in the state to estimate the greenhouse gas emissions from short- and long-range plans to ensure they meet emissions targets.[31] The Colorado DOT released a briefing update outlining VMT reduction strategies.[32]

Lessons learned

Establishing a VMT target through legislative action creates some accountability to state and local agencies, although not without appropriate tracking and enforcement mechanisms. This is partly because VMT reduction is essentially everyone's responsibility and nobody's responsibility. The DOT can point to local governments and land use regulators as not meeting their objectives and vice versa. There are two important considerations for VMT targets to be actionable:

1. There should be frequent benchmarks for different agencies and geographic areas, to understand if progress is being made and where new actions might be needed;
2. The state should decide on appropriate accountability measures, such as funding or procedural constraints.

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[28] https://www.maine.gov/climateplan/the-plan

[29] https://app.leg.wa.gov/RCW/default.aspx?cite=47.01.440

[30] https://www.dot.state.mn.us/sustainability/advisory-council.html

[31] https://energyoffice.colorado.gov/blog-posts/colorado-approves-nation-leading-rule-to-cut-greenhouse-gas-emissions-by-shifting-how-it

[32] https://www.codot.gov/programs/environmental/greenhousegas/assets/final-transportation-ghg-briefing-memo-june-16-2021.pdf

In many ways, establishing the appropriate accountability measures can be more important than landing on a particular target. Nonetheless, the numbers behind a VMT target have important implications for policymakers, agencies, and stakeholders. Some key considerations are described below.

Agreeing on targets

VMT reduction targets can be aspirational, practical, or some combination of the two. It can be a valuable exercise to start with aspirational targets, then ask agencies and policymakers to walk through different policy approaches and gain a better understanding of what policy actions are needed and how hard they can imagine pulling on certain levers to meet more ambitious goals.[33] These policy levers include the following (each has a different potential impact):

- Increase investments in transit.
- Improve walking and biking conditions (including transit connections).
- Limit development in outlying areas that are difficult to access without driving.
- Encourage more development in central areas where less driving is needed.
- Avoid road capacity investments that facilitate outward growth.
- Implement TDM programs that encourage travelers to consider a range of travel options.
- Price road use and parking in transparent ways that let travelers make more informed decisions about their travel options.

Expressing targets

VMT targets can be expressed mainly in three ways, each of which is important to consider:

1. Reduction below current total. This is the most important target for understanding how the state will meet its overall greenhouse gas or clean energy goals. If total VMT increases, for instance, more work will be needed to make vehicles more efficient and move to renewable energy sources. If VMT decreases, however, the state will be more likely to meet its goals and less energy use will be needed. However, bending the current upward trend of VMT will be challenging.

2. Reduction below current rate (per capita). VMT per capita may be the most useful measure for understanding and tracking VMT targets, especially in the near-term. As population increases, the state is likely to see an increase in VMT, while potentially lowering the average VMT per person.

3. Reduction below target year baseline. Measuring reductions below some baseline VMT trend is useful for understanding the potential impacts of population growth and different policy scenarios. For instance, policies that apply mainly in urban areas could have a different overall impact than those that apply in more suburban or rural areas, especially depending on anticipated growth patterns. The main challenge is that it is difficult to establish a baseline, given the potential of socioeconomic and technological factors. For that reason, a useful baseline is simply to apply the current per capita VMT rate to an accepted population forecast.

[33] SSTI walked through this exercise with the Minnesota DOT to understand how they could meet a 20% reduction goal, proposed by their Sustainable Transportation Advisory Committee.

Communicating VMT reduction strategies and related outcomes

VMT reduction targets tend to garner opposition from some members of the public and agency staff. Reasons include:

- Lower VMT translates into lower transportation revenues [under the existing framework].
- There is a perceived link between VMT and economic productivity, mainly because economic downswings often translate into lower VMT.
- Lowering VMT is often perceived as a constraint on freedom. In other words, it is often seen as "anti-car" or "anti-suburb."
- Pricing is an important policy lever in reducing VMT, so it is seen as raising transportation costs.
- Lowering VMT is seen as more challenging or unnecessary for achieving climate goals, compared to vehicle electrification.

Framing

It is important to frame VMT reduction targets carefully. Here is one approach:

1. Reducing VMT is not the goal. Lowering energy use and emissions is the goal.
2. An important step toward lowering transportation energy use and emissions is to give people safe and convenient travel options so they can drive shorter distances, drive less often, and access more opportunities without needing to drive. Moreover, increasing VMT will make it more difficult to reduce energy use and emissions.
3. VMT is an important metric for understanding how transportation policies and travel behavior align with clean energy and emissions goals.

State officials should be prepared to explain what lowering VMT looks like to a typical resident. For example:

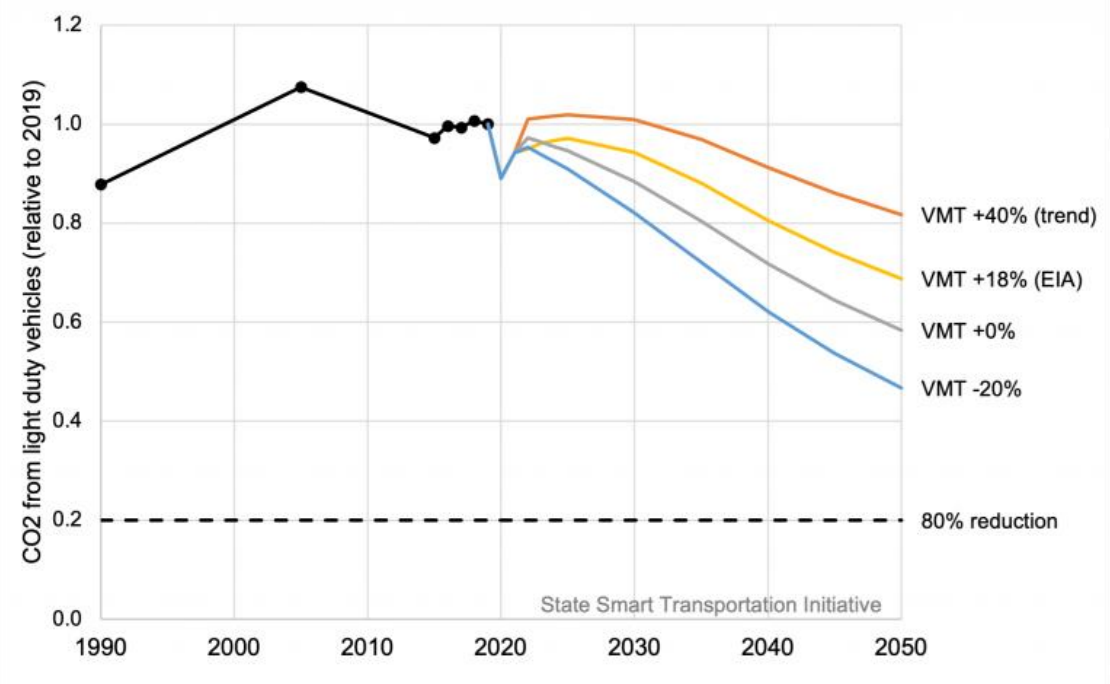
> *The average person will drive 15 percent less than they would today. This number may be higher in some places (like city centers) and low in other places (like rural areas). It will also take different forms for different people. Some people may take transit to work instead of driving, but still drive for other purposes. Some people may drive to work, but live in a neighborhood where they can walk or bike to nearby shops and restaurants. Some people may work several days a week from home and drive less often or drive shorter distances for other activities.*

VMT versus electrification

Some question the importance of lowering VMT, compared to the benefits of vehicle electrification. There are several important considerations:

1. There is still a high level of uncertainty in both future VMT and the rate of vehicle electrification. Just as electrification may take longer than anticipated, VMT could increase, counteracting the benefits of cleaner vehicles. The state might benefit from looking at different future scenarios, similar to those by SSTI at the national level (shown below).[34]

[34] https://ssti.us/2021/09/13/the-amount-we-drive-could-make-or-break-clean-energy-plans/



2. Even with cleaner fuels and electric vehicles, VMT and vehicle ownership have negative environmental impacts. For instance, an electric vehicle in Hawaii today still produces about three-quarters the emissions of a gas-powered vehicle.[35] There are also environmental impacts from vehicle and infrastructure production, particulates from brakes and tires, and battery production and disposal.
3. Climate is not the only reason to consider policies for reducing VMT. Additional benefits include:
    - More active transportation and better health outcomes.
    - Safer streets and fewer traffic injuries or deaths.
    - A wider range of travel options.
    - More equitable access for those who cannot or do not drive.
    - Stronger local economies.
    - Lower transportation and housing costs overall.

Pricing and transportation costs

According to research and best practices, charging users directly for road use and parking is one of the most impactful ways to lower VMT. This can be seen as putting additional costs on road users. Here are some considerations:

- A mileage-based road pricing strategy will probably be needed to replace the gas tax as more vehicles become electrified.
- Travel demand is elastic. As prices increase, travel demand decreases.
- Charging even a small amount (or simply showing costs in real time) can cause a shift in travel behavior.

[35] https://evtool.ucsusa.org/

- We currently build excess road capacity and parking, which increases overall transportation, maintenance, development, and housing costs. These are potential cost savings in a more efficient system.
- Road and parking pricing should work in conjunction with multimodal investments. Pricing tools work best in central areas with good travel options, and those revenues can be used to provide more options in more areas.
- For priced parking to be plausible, parking supply needs to be better managed. In other words, local governments must first tackle land use regulations like minimum parking requirements before there can be a market for parking.

Case study: California

Having gotten an earlier start than some other states in identifying its climate goals, California has made meaningful progress in accommodating VMT reduction strategies at various levels of governance. Traditionally, under the California Environmental Quality Act (CEQA), vehicle delay and lower level of service (LOS) were viewed as a negative environmental impacts—a line of thinking that fueled outward growth and road expansions. A law signed in 2013 (SB 743) initiated an update to the CEQA guidelines to change how lead agencies evaluate land use and transportation impacts, with the goal of better measuring the environmental impacts of any given project. This prompted state and local agencies to develop new tools and methodologies for evaluating VMT impacts that were better able to promote the state's goals of reducing greenhouse gas emissions and traffic-related air pollution.

Local development impacts

Although state agencies often exercise limited authority over land use decisions, with the new CEQA guidelines and support from the Office of Planning and Research (OPR), municipal authorities in California have now developed tools for estimating environmental impacts of development projects in terms of VMT. Projects that trigger a substantial VMT impact are required to evaluate mitigation strategies. Many of those strategies are outlined in the Quantifying Greenhouse Gas Mitigation Measures guide by CAPCOA[36].

Here are two noteworthy tools:

1) ***San José VMT Evaluation Tool[37]***
   San José's VMT Evaluation Tool is an Excel-based tool that evaluates whether proposed land use projects in the City of San José would generate VMT impacts. Projects that would trigger a VMT impact can evaluate a variety of strategies to reduce those impacts.
2) ***San Francisco's Transportation Demand Management Tool[38]***
   The program seeks to reduce VMT generated in new development projects through a citywide TDM program established in the Planning Code (Sec 169). The program applies to all new multi-family residential or group housing developments over the threshold of 10

[36] http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

[37] https://www.sanjoseca.gov/your-government/departments-offices/transportation/planning-policies/vehicle-miles-traveled-metric

[38] https://sfplanning.org/resource/transportation-demand-management-tdm-tool

units, new non-residential development over 10,000 sq.ft., and existing developments applying for an increase in parking spaces.

SSTI also published a report in 2018, Modernizing Mitigation, that expands VMT-based land use reviews beyond the CEQA framework for applications outside of California.[39] Once California finalizes its broader transportation- and regional land use-review process, other agencies could benefit from its example for not just creating a more sustainable transportation system, but also more livable environments.

Statewide transportation impacts

After the passage of SB 743, OPR worked with the National Center for Sustainable Transportation at UC Davis to develop a calculator for estimating the impact of highway capacity projects on VMT, based on the theory of induced demand. The calculator incorporates extensive research from across the U.S. that shows highway capacity projects cause more driving, first through individual changes in travel behavior and then because of new development patterns spurred by the road improvements. The calculator lets agencies estimate the increase in VMT from road projects over a 5- to 10-year period based on simple relationships between new lane-miles and increased travel. Projects that result in significant VMT impacts are subject to mitigation.

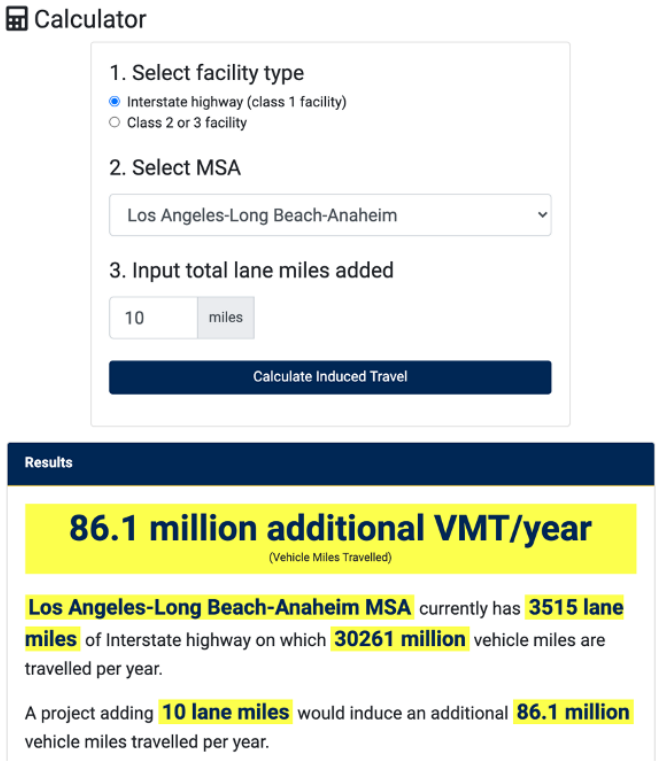


Figure 1. Sample inputs and outputs using California's Induced Demand Calculator.[40]

[39] https://ssti.us/modernizing-mitigation/

[40] https://travelcalculator.ncst.ucdavis.edu/

Starting July 1, 2020, California moved away from estimating LOS improvements from proposed transportation projects, formalizing the use of the Induced Travel Calculator for evaluating statewide transportation investments. VMT evaluation under CEQA's new guidelines is required for a wide range of projects. The California State Transportation Agency (CalSTA) is overseeing the development of processes to measure project impacts more broadly.

A national version of California's induced demand calculator was recently launched by a consortium of researchers and transportation advocacy groups, allowing policymakers, agency staff, and stakeholders to analyze the impacts of highway capacity projects on VMT in any urbanized area throughout the U.S.[41]

Climate Action Plan for Transportation Infrastructure

In July 2021, CalSTA adopted the Climate Action Plan for Transportation Infrastructure (CAPTI), a plan created in response to Governor Gavin Newsom's executive orders[42] to leverage infrastructure development to reduce VMT. CAPTI includes 28 action items intended to "help advance a slate of projects that meet climate goals, ensure that these projects are prioritized for state funding, and promote project construction and operations that minimize emission and impacts from climate change."

CAPTI strategies that might be of interest to other states include:

- Investment strategies: CalSTA and Caltrans will develop new ways to mitigate increases in VMT from highway projects. One such approach would be mitigation banks, permitting project sponsors to purchase allowances that would go to fund VMT-reduction projects.
- Pricing: CalSTA and Caltrans will convene a working group to explore regional pricing strategies, such as cordon pricing and congestion pricing.
- Fostering development that is less car-reliant: State agencies could leverage transportation funding to incentivize low-VMT land use policies, including streamlined approval for multifamily and mixed-use developments, reduced off-street parking requirements, or density bonuses.
- Prioritizing safety and managing transportation demand: CalSTA and Caltrans could convert underutilized highways into multimodal boulevards.

Case study: Virginia

Unlike California, the state of Virginia has not set a VMT reduction goal but, like several other states, it has moved toward a more data-driven, outcome-oriented project prioritization and investment process that could serve as a valuable model for achieving climate goals and balancing them with other goals. Through its SMART SCALE program, Virginia has diversified its spending on a broad range of multimodal projects, including bicycle, pedestrian and transit investments.

[41] https://shift.rmi.org/

[42] https://www.gov.ca.gov/wp-content/uploads/2019/09/9.20.19-Climate-EO-N-19-19.pdf

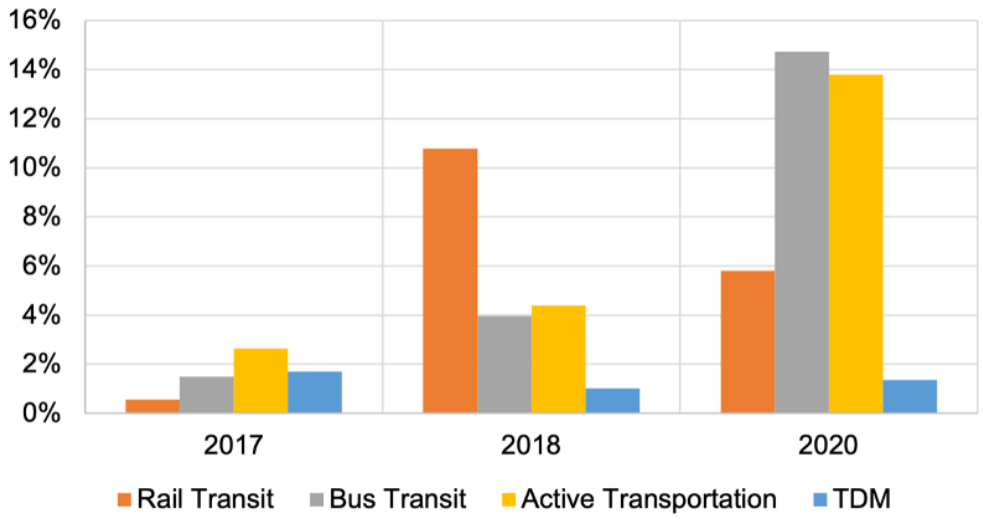


Figure 2. Awarded funds under Virginia's Smart Scale program by project type.[43]

In 2014, the Virginia legislature passed a law (HB2) requiring a statewide prioritization process for transportation project selection, which ultimately became the SMART SCALE program. Instead of designating different pots of money for highways, transit, and active transportation, Virginia's discretionary funds are divided in two: 45% for maintenance and 55% for SMART SCALE, which is open to projects ranging from major highways to local bicycle and pedestrian improvements. The program requires transportation projects to be scored out of a total of 100 points based on six criteria—congestion mitigation, economic development, accessibility, safety, environmental quality and land use—then ranked based on its benefit per dollar requested. For both the accessibility and land use efficiency criteria, the program incorporates comprehensive, multimodal accessibility metrics, which evaluate how well transportation investments connect people to jobs and services, including impacts to disadvantaged populations.

SMART SCALE offers several important advantages, especially regarding climate and clean energy. On the one hand, it moves away from the traditional cost-benefit analysis approach, which relies heavily on monetary benefits and often prioritizes vehicle speeds over environmental impacts. In the case of SMART SCALE, different outcomes are valued and assigned relative weights in advance of the scoring process. On the other hand, the program goes a step further than many other programs in maximizing the benefits of each dollar spent, because only projects that receive the most points per dollar are selected for funding. This contrasts with more ad hoc approaches, including earmarks, that at a minimum aim to guarantee some return on investment, but don't go as far as maximizing that return across a wide range of interests.

Accessibility analysis and VMT implications

Virginia's SMART SCALE program pioneered the use of accessibility analysis for project prioritization among state DOTs. The methods and technical platforms used by the Virginia DOT to

[43] https://ssti.us/2021/05/18/three-steps-toward-smarter-transportation-investments/

measure access to jobs and services have advanced considerably over four rounds of project scoring, and several other platforms are readily available to other interested agencies. Many of these tools and applications are outlined in Measuring Accessibility, published by SSTI in early 2021.[44]

While the current approach to measuring accessibility in Virginia is mode agnostic—i.e., improvements to automobile accessibility and transit accessibility are weighted equally—there is an opportunity to consider the relative accessibility impacts of different modes of travel as proxy measures for VMT impacts. For instance, projects that increase access to jobs by transit, relative to access to jobs by driving, are more likely to lead to lower average VMT in the long run. SSTI is currency leading research with several state agencies to better understand these potential applications.

[44] https://ssti.us/accessibility-analysis/#guide